14. STOCHASTIC MODELS

Size and Growth of Firms in the Cotton Textile Industry

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The growth behaviour of the organised sector of the cotton textile industry has been very sluggish during the last three decades. In this study we model growth behaviour of cotton textile companies with the help of the 'Law of Proportionate Effect': given by

$$\frac{S_{jt}}{S_{j(t-1)}} = G_{jt}Q(S_{j(t-1)})$$

where S_{jt} is the size of jth firm at time t, G_{jt}'s are identically and independently distributed random variables and Q is any functional form. S_{jt} follows asymptotically the log-normal distribution. Thus, the joint distribution of firm size at time t and $t-1$ is bivariate log-normal. Therefore, the regression equation for explaining size at time t on the basis of size at time $t-1$ will be:

$$\log S_{jt} = \alpha + \beta \log S_{(t-1)j} + \varepsilon_{jt}$$

with usual notation. The parameter β has certain interesting economic interpretations. Also, we have $\sigma_t/\sigma_{t-1} = |\beta|/|\rho|$ which explains change in industrial concentration. We work with this model. The main conclusions of the study are:

(i) The large companies did not have advantage of size for forging higher growth rate compared with the small companies. The growth in sales of top cotton textile companies was tardy or at most random.

(ii) By and large, the market concentration had tended to reduce over time.

Models for Epidemics with Bunching

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The usual deterministic model for the general epidemic considers $x(t)$, $y(t)$, $z(t)$ susceptibles, infectives and removals at time $t \geqslant 0$ respectively $(x(t)+y(t)+z(t) = N)$. The epidemic is governed by the equations

$$\frac{dx}{dt} = -\beta xy, \qquad \frac{dy}{dt} = \beta xy - \gamma y, \qquad \frac{dz}{dt} = \gamma y$$

where β, γ are infection and removal parameters. This model can be extended to